The Jordan Valley WCD Discharge to the Jordan River

Utah Division of Water Quality

October 2003

The Issue

- 1. Areas of the SW Salt Lake Valley contain Sulfate and Se from the plume and natural sources [SO4]
- 2. Reverse Osmosis [RO] Technology can create Drinking Water
- 3. RO also creates a reject water higher in SO4 (TDS) and Se
- 4. How do you get rid of the elevated TDS and Selenium in the reject water?

Options for Disposal

- 1. Discharge to the River
- 2. Discharge to the tailings pipeline
- 3. Build a total containment lagoon
- 4. Etc.

- A total of 11 different scenarios was evaluated. It was determined by JVWCD that the discharge to the Jordan river was the preferred alternative.

Does JVWCD have a "right" to discharge to the river?

- The duty of the Division of Water Quality is to insure that any discharge that may be permitted will not cause a beneficial use of the receiving water to be impaired.
- If those conditions are met, the applicant is granted a permit.

So, the question becomes ---

- 1. Will this discharge cause the water quality standards to be exceeded in the river?
- 2. Will this discharge cause water quality standards to be exceeded in the wetlands?
- 3. Will this discharge cause selenium to accumulate in the wetlands.
- 4. Will this discharge cause water quality to be degraded in the Great Salt Lake itself?

Discharge Permits

- How do we make sure it is OK? How do we set the permit limits?
  - Determine Critical Low Flow (7Q10) for rivers
  - Calculate the Permit Limit at critical low flow for rivers and at 35 ft. and 200 ft. for lakes
  - Compare against the standard after mixing in the river, lake, or reservoir.

Why are people talking about loads?

- A load is a value that passes a point on a river.
- A load is a value that moves into a reservoir, lake, or wetlands.
- It is also a value that moves out of a reservoir, lake, or wetland.
- It is also a value that can remain behind in the Great Salt Lake.

How is load determined?

- It is calculated by taking a concentration (mg/l) and multiplying it by a flow (cfs) with an appropriate conversion factor (5.39)
- For example:
  - 0.0025 mg/l * 144 cfs * 5.39 = 1.94 lbs/day
- Also by multiplying the volume of a wetlands by a concentration in that water body.
  - 100 Ac. Ft. @ 0.0025 mg/l = 29.3 tons

Which is most important: Load or Concentration?

- Concentration is used when you want to make sure that water quality standards are met in a receiving water.
- Loads are used when you want to reduce or allocate contributions from several dischargers so that the effluent limits meet a certain concentration.
- It all comes back to the water quality standards which are expressed as a concentration.

Let's talk about loads into a wetland.

- If the concentration in the wetland doesn't exceed water quality standards are we concerned?
- If a "load" comes to a wetland from a river, is it equivalent a dump-truck load being dumped into the wetland?
- Will that load stay in the wetlands?

Let's talk about a concentration in a river and the standards.

- Standards are based on concentration
  - TDS 1200 mg/l [Agricultural Beneficial Use]
  - Se: 0.005 mg/l [Aquatic Wildlife B.U.]
- If the water quality standards are not exceeded, the beneficial use in the river or wetlands is not impaired.
- Another way of saying it is that the river is protected for a certain beneficial use.

What does all this mean?

- This means that at the critical low flow (7Q10) the concentration of the Jordan River is expected to be below the 4.22 ug/l Standard.
- The rest of the time (99.8%) the Se concentration in the river will be even less than that since the flows in the river will be higher [not @ low flow].

What about the TDS?

- We have seen the river have a concentration greater than 1200 mg/l. What happens then?
- The permit will be reopened to reflect the consistent change in the background conditions of the environment upon which the permit was originally based.

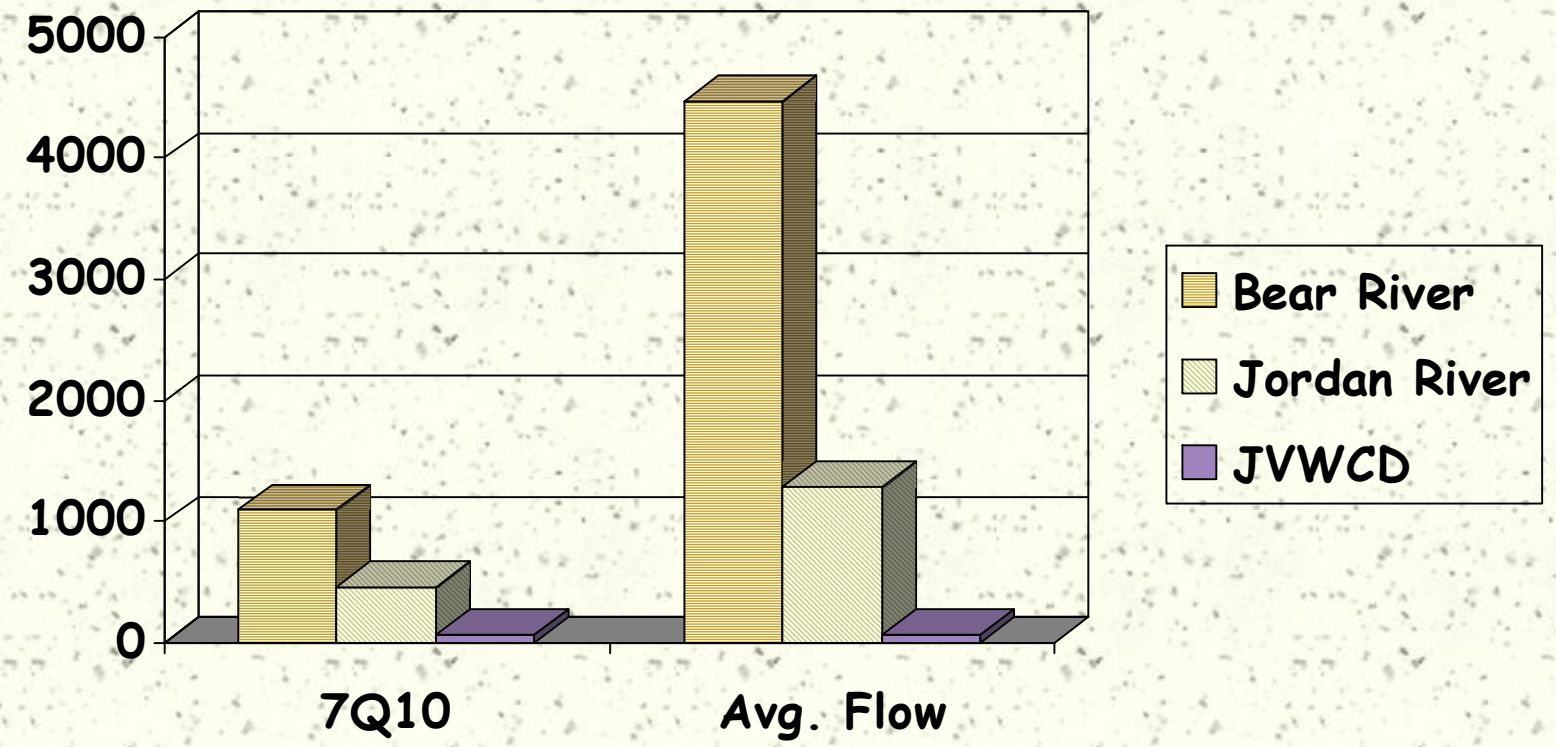
Permit Limits now being evaluated

Discharge Location	Jordan River Water Quality Standard	Jordan River Critical Low Flow [Q]	Jordan River Background Conc.	Permit Season Requirement	Flow Limitation Requirement (Not to Exceed)	Parameter Conc. Requirement (Not to Exceed)	Jordan River Water Quality after Mixing with Discharge
8300 South Point 001	TDS 1200 mg/l	31.7 cfs	1290 mg/l	All	12 MGD	500 mg/l	998 mg/l
	Selenium 4.6 ug/l	31.7 cfs	3.5 ug/l	All	12 MGD	(Allowed: 6.48 ug/l) Permitted: 3.24 ug/l	3.4 ug/l
2900 South Point 002	TDS 1200 mg/l	189.9 cfs	1081 mg/l	All	2.0 MGD	8,350 mg/l	1198 mg/l
	Selenium 4.6 ug/l	189.9 cfs	3.5 ug/l	All	2.0 MGD	(Allowed: 72.04 ug/l) Permitted: 48.50 ug/l	4.22 ug/l

How much TDS Load comes into the wetlands?

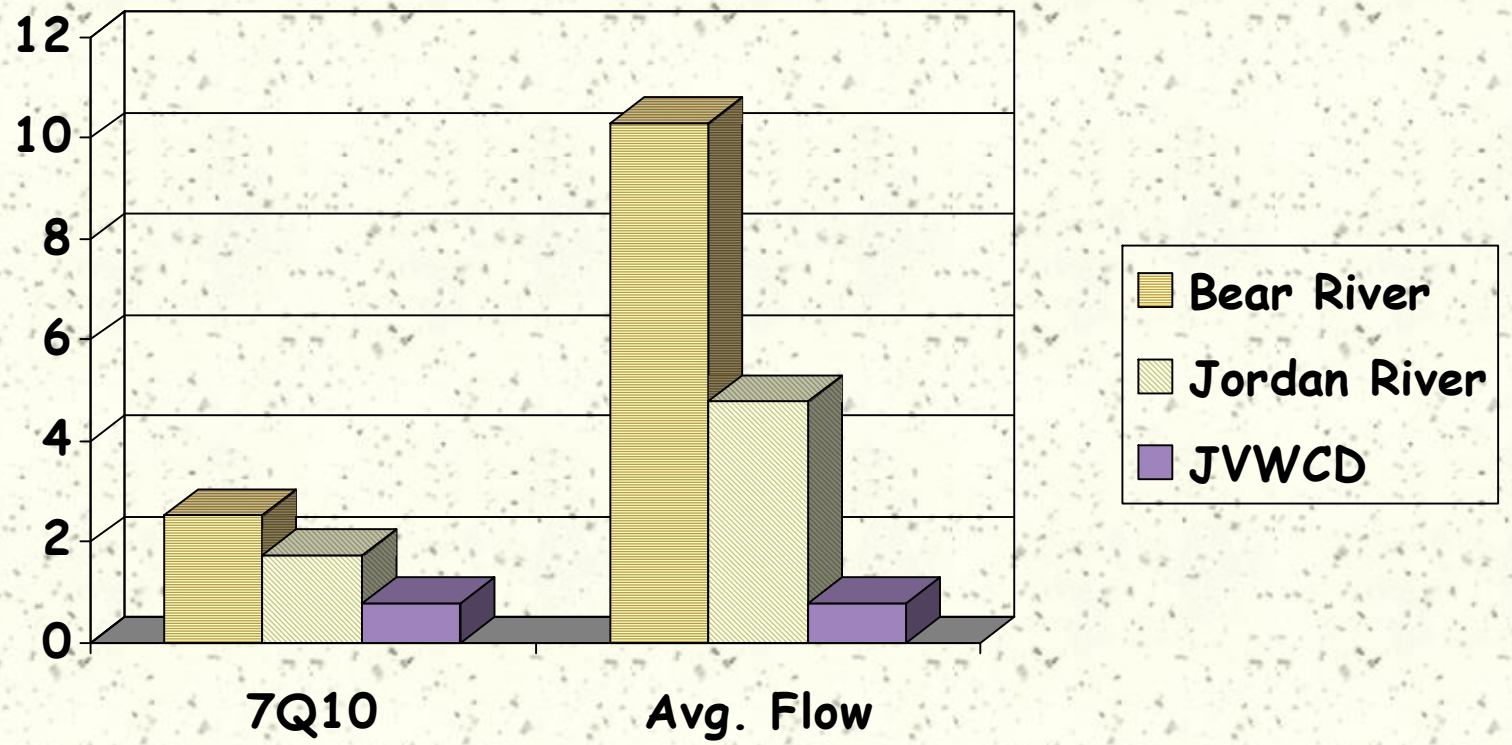
- From the Bear River
  - 4,472 tons per day into the Bear River Bird Refuge (76.7%)
- From the Surplus Canal & LowerJordan River (22.0%)
  - 928 tons per day into the S.C. wetlands
  - 356 tons per day into J.R. wetlands
- And from the JVWCD Discharge (1.2%)
  - 50 Tons/day to the Surplus Canal
  - 19 Tons/day to Lower Jordan River

How much TDS Load (tons/day) comes into the wetlands?



0.2% of the time over 10 Years.

How much Se Load (lbs/day) comes into the wetlands?

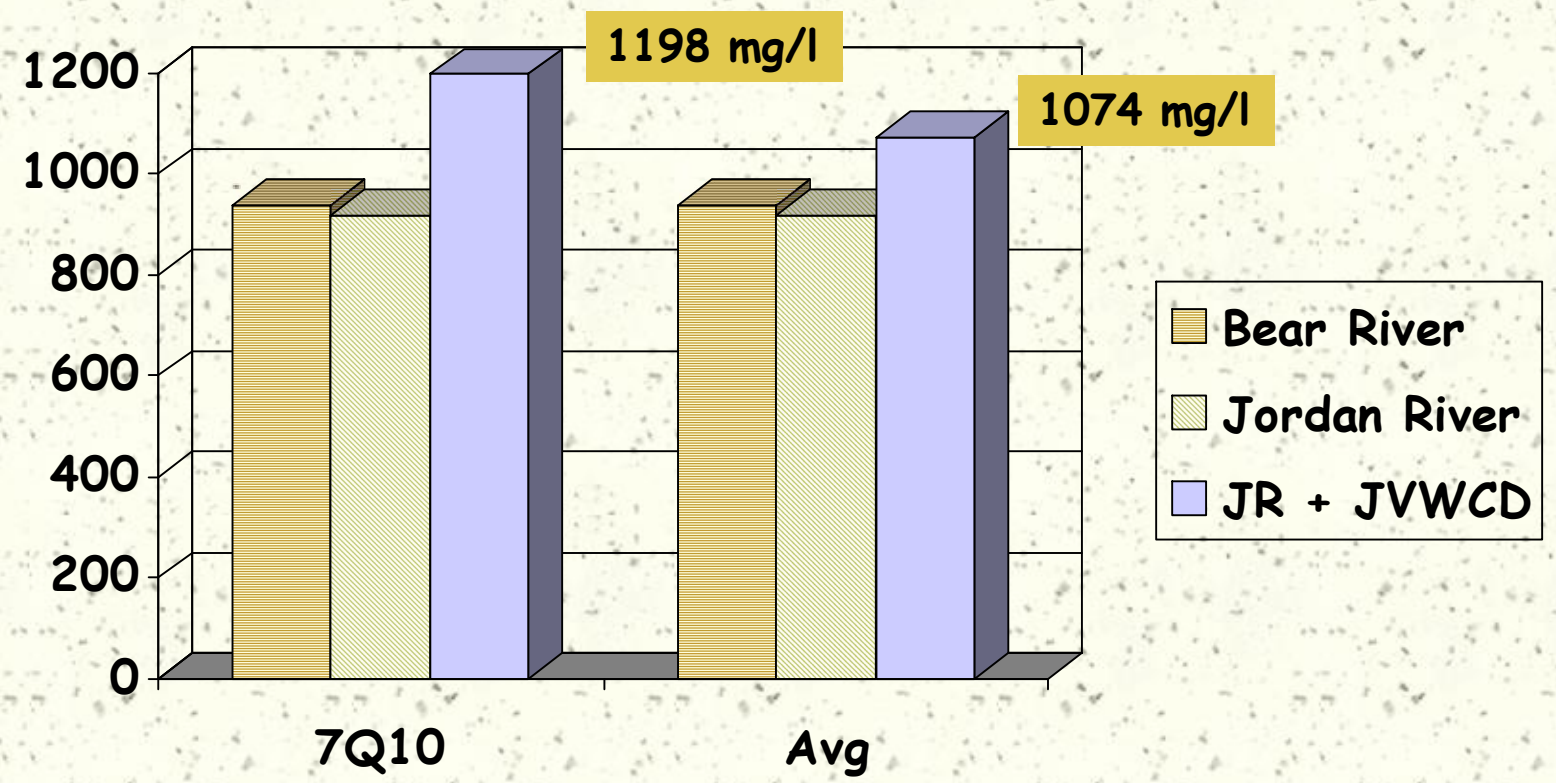


0.2% of the time over 10 Years.

Is this much loading prudent?

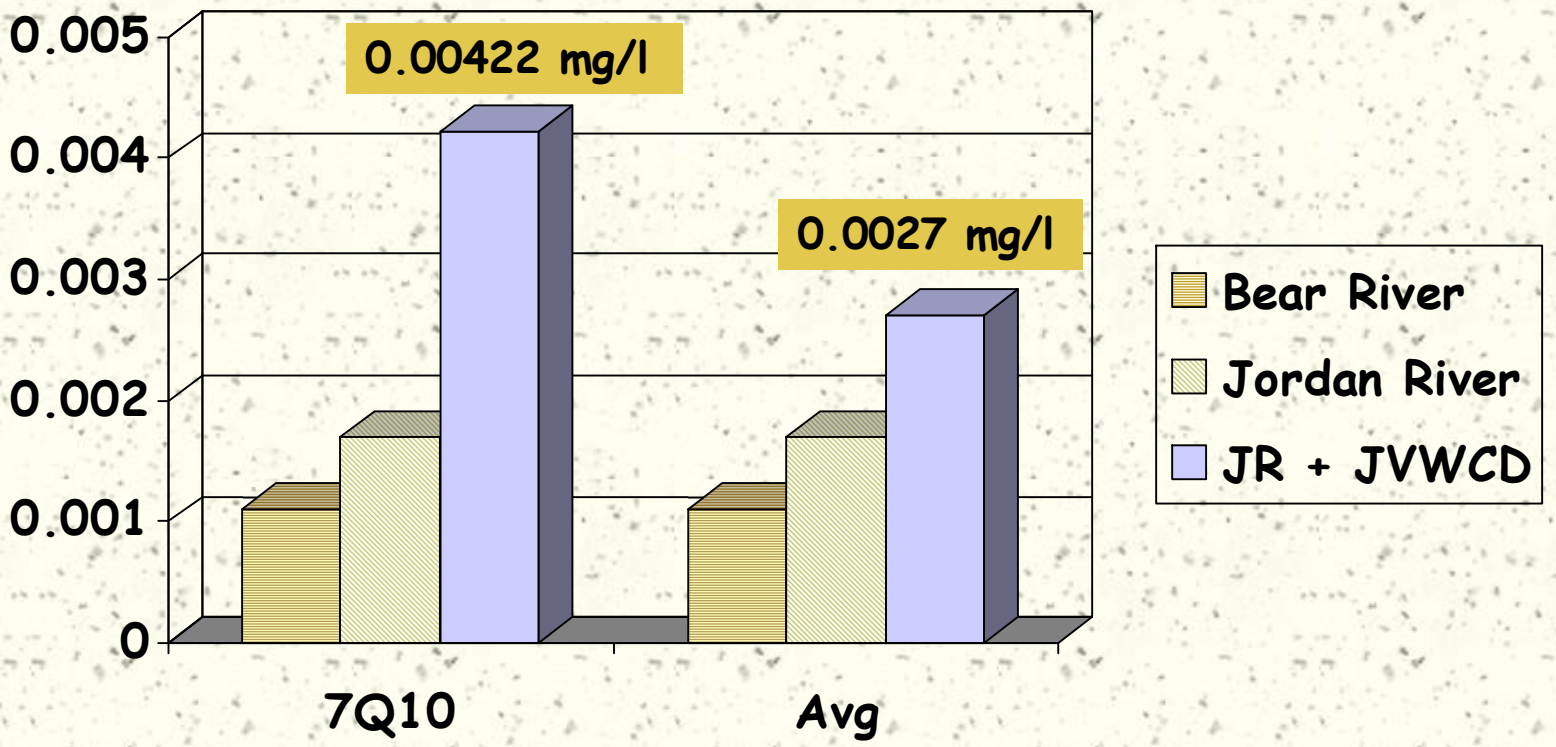
- Again, the issue is concentration. If the water quality standards are not caused to be exceeded by this permit, we have no basis to disapprove it.
- The Division will monitor not only this permit, but the receiving waters, to ensure that the environment is protected.

What will happen to the TDS concentrations?



0.2% of the time over 10 Years.

What will happen to the Se concentrations?



0.2% of the time over 10 Years.

Will selenium be deposited into the wetlands?

- The solubility product (a chemical term) determines if precipitation will occur.
- If the concentration of selenium and another component are less than the solubility product, then precipitation is not expected to occur.

Will selenium be deposited into the wetlands? (cont'd)

- The solubility product for these compounds is not met in the Jordan River nor its wetlands.
- Hence, no precipitation of selenium is expected.

What about the Selenium in the Great Salt Lake

- The current "standard" for Se in the Great Salt Lake is 0.027 mg/l.
- The selenium load is continually brought into the Great Salt Lake by the Bear River and the Jordan River and eventually precipitates to the sediments of the lake.

Back to our original questions….

- 1. Will this discharge cause the water quality standards to be exceeded in the river? --- No.
- 2. Will this discharge cause water quality standards to be exceeded in the wetlands? --- No.
- 3. Will this discharge cause selenium to accumulate in the wetlands. --- No.
- 4. Will this discharge cause water quality to be degraded in the Great Salt Lake itself? --- No.